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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/585,326

07/06/2006

Harue Nakashima

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9757

31780

7590

05/25/2010

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EXAMINER

BOHATY, ANDREW K

ART UNIT

PAPER NUMBER

1786

MAIL DATE

DELIVERY MODE

05/25/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,326	<b>Applicant(s)</b> NAKASHIMA ET AL.	
	<b>Examiner</b> Andrew K. Bohaty	<b>Art Unit</b> 1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 10,11,29-33 and 49-54 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10,11,29-33 and 49-54 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 23, 2010 has been entered.

2. This Office action is in response to the amendment filed April 23, 2010, which amends the specification and claim 10, cancels claims 12, 13, 25, 26, and 34-38, and adds claims 49-54. Claims 10, 11, 29-33, and 49-54 are pending.

### ***Response to Amendment***

3. The applicant's perfection of foreign priority filed April 23, 2010 overcame the rejection of claims 10-13, 25, 26, and 29-38 under 35 U.S.C. 103(a) as being unpatentable over Hwang et al. (US 2006/0020136) in view of Hosokawa (US 6,660,410) and Thompson et al. (US 2003/0175553) as set forth in the Office action mailed December 23, 2009.

4. The applicant's cancellation of claims 12, 13, 15, 26, and 34-38 filed April 23, 2010 overcame the rejection of claims 12, 13, 25, 26, 34, 35, 37, and 38 under 35 U.S.C. 103(a) as being unpatentable over Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) in view of Hosokawa (US

6,660,410) and Thompson et al. (US 2003/0175553) as set forth in the Office action mailed December 23, 2009.

5. The applicant's cancellation of claims 12, 13, 15, 26, and 34-38 filed April 23, 2010 overcame the rejection of claim 36 under 35 U.S.C. 103(a) as being unpatentable over Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) in view of Hosokawa (US 6,660,410), Thompson et al. (US 2003/0175553) and Lee et al. (US 2001/0046612) as set forth in the Office action mailed December 23, 2009.

### ***Response to Arguments***

6. In response to the applicant's arguments on pages 24 and 25 that Onikubo et al. (US 2004/0151944) (hereafter "Onikubo") in view of Hosokawa (US 6,660,410) (hereafter "Hosokawa") and Thompson et al. (US 2003/0175553) (hereafter "Thompson") does not teach a carbazole compound, where the group that corresponds to applicant's Ar<sup>21</sup> is a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, or a heteroaryl group having 5 to 9 carbon atoms, Onikubo teaches that this group can be perylene and the applicant teaches in newly added claims 49 and 52 that substituted phenyl groups and substituted naphthyl groups can include ring structures. The applicant discloses a pyrenyl group as a substituted phenyl group or substituted naphthyl group; therefore, the applicant discloses that substituents on the phenyl groups and naphthyl groups can form ring structures. The perylene group taught by Onikubo can therefore be looked at as a substituted naphthyl

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group. Onikubo in view of Hosokawa and Thompson reads on applicant's claim 10, where Ar<sup>21</sup> is a substituted naphthyl group.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 49 and 52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

9. In claims 49 and 52, the applicant claims “wherein the substituted or unsubstituted phenyl group and the substituted or unsubstituted naphthyl group are selected from a phenyl group, a 4-phenyl group, a 1-naphthyl group, a 2-naphthyl group, a 9-anthryl group, a 9-phenanthryl group, a 1-pyrenyl group, a 9,9'-dimethyl-2-fluorenyl group, a spiro-9,9'-bifluorene-2-yl group, a m-tolyl group, a p-tolyl group, a 2-fluorophenyl group, a 3-fluorophenyl group, a 4-fluorophenyl group”, but applicant in the specification does not disclose these compounds as substituted or unsubstituted phenyl groups or substituted or unsubstituted naphthyl groups. The applicant discloses these compounds as aryl groups having 6 to 25 carbon atoms (see paragraph [0053] of the specification).

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 10, 11, 29-33, and 49-54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Regarding claims 10, 49, 50, and 52, the applicant claims R<sup>21</sup> is a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, or a heteroaryl group having 5 to 9 carbon atoms and then further claims that wherein the substituted or unsubstituted phenyl group and the substituted or unsubstituted naphthyl group are selected from a phenyl group, a 4-phenyl group, a 1-naphthyl group, a 2-naphthyl group, a 9-anthryl group, a 9-phenanthryl group, a 1-pyrenyl group, a 9,9'-dimethyl-2-fluorenyl group, a spiro-9,9'-bifluorene-2-yl group, a m-tolyl group, a p-tolyl group, a 2-fluorophenyl group, a 3-fluorophenyl group, a 4-fluorophenyl group. It is unclear what the applicant interprets a substituted or unsubstituted phenyl group and a substituted or unsubstituted naphthyl group to be. The examiner will interpret a substituted or unsubstituted phenyl group and a substituted or unsubstituted naphthyl group to include substituents that come together and form a ring.

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

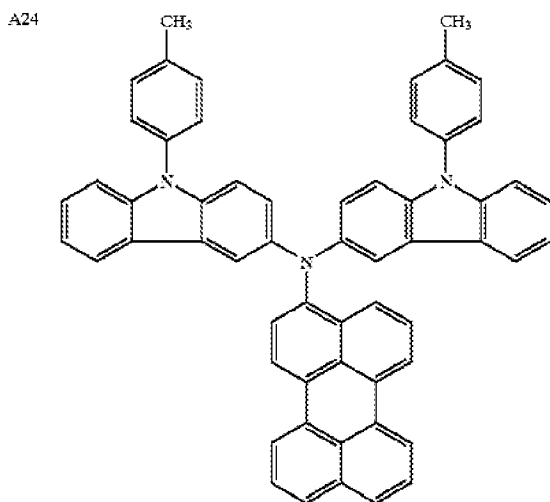
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. Claims 10, 11, 29, 30, 32, 33, 50, 51, 53, and 54 are rejected under 35 U.S.C.

103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) (hereafter

"Onikubo") in view of Hosokawa (US 6,660,410) (hereafter "Hosokawa") and Thompson et al. (US 2003/0175553) (hereafter "Thompson").

16. Regarding claims 10, 11, 29, 30, 32, 33, 50, 51, 53, and 54, Onikubo teaches a carbazole derivative (compound A24 page 11) with the following structure,



. Onikubo teaches a light emitting element (Fig.

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1A and 1B, objects 11, 12, 20, and 21, paragraphs [0068] and [0069]) comprising of an anode (Fig. 1A and 1B, object 11), a cathode (Fig. 1A and 1B, object 12), and a light-emitting layer between the anode and the cathode (Fig. 1A, 20, Fig. 1B, 21, paragraphs [0068] and [0069]), wherein the light-emitting layer comprises a carbazole derivative (compound A24 is an A compound, paragraph [0048] and [0049]) and can contained additional luminescent substances. Onikubo teaches that a mixture of compound A, where A24 is a carbazole, and compound B are used as a light emitting layer (paragraph [0048] and [0049]) and this layer can be in contact with the anode (Fig. 1A, 11 and 20, paragraph [0068]). Onikubo teaches that these light emitting elements can be used in light sources and displays (paragraph [0001]).

17. Onikubo does not specifically teach where the N position of the carbazole group contains a biphenyl group.

18. Hosokawa teaches carbazole derivatives that can be used for light emitting devices (column 2 lines 56-67 and column 3 lines 1-29, compounds (11) and (16)) wherein the N position of the carbazole contains a biphenyl group. Hosokawa teaches that by changing the substituent attached to the carbazole group can change the glass transition of the material and that the glass transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54).

19. Thompson teaches carbazole derivatives that can be used for light emitting devices. Thompson teaches that adding polyphenyl groups to the N position of



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carbazoles will increase the glass transition of the material and therefore increase the lifetime of the material producing light emitting devices with improved lifetimes (paragraphs [0074] and [0075]).

20. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivative of Onikubo so the N positions of the carbazoles contained a biphenyl group. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material.

21. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Onikubo et al. (US 2004/0151944) (hereafter "Onikubo") in view of Hosokawa (US 6,660,410) (hereafter "Hosokawa") and Thompson et al. (US 2003/0175553) (hereafter "Thompson") as applied to claims 10, 11, 29, 30, 32, 33, 50, 51, 53, and 54 above, and further in view of Lee et al. (US 2001/0046612) (hereafter "Lee").

22. Regarding claim 31, Onikubo in view of Hosokawa and Thompson does not teach a light-emitting element, wherein the carbazole derivative is included between the anode and a layer having a light-emitting layer which is included in the layer including a luminescent substance.

23. Lee teaches that carbazole derivatives can be used as a hole-transporting material (paragraph [0032]) and used in a hole-transporting layer which is between the anode and the light emitting layer (paragraph [0073]) to provide an EL device with increased thermal stability (paragraph [0011]). Lee also teaches that multilayer systems

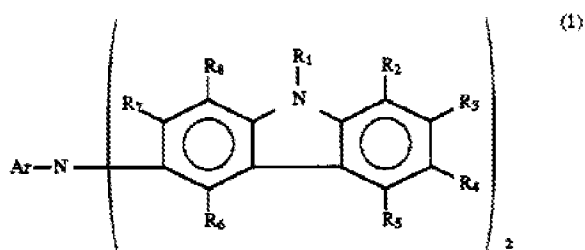
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that include a hole-transporting layer improve efficiency and luminance of an EL device (paragraph [0009]).

24. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the light-emitting element, of Onikubo in view of Hosokawa and Thompson, to include a carbazole containing hole-transporting layer between the light-emitting layer and the anode as taught by Lee. Since Lee teaches carbazoles as a hole-transporting materials, the carbazole of Onikubo in view of Hosokawa and Thompson, could be used in the hole-transporting layer. The motivation would have been to produce a light-emitting element with improved efficiency and luminance.

25. Claims 10, 11, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka et al. (US 5,756,248) (hereafter "Tanaka").

26. Regarding claim 10, 11, and 49, Tanaka teaches a carbazole formula,



, (formula (1) column 3 lines 11-32) that

represents applicant's general formula (3), wherein  $R^{21}$  and  $R^{24}$  (applicant's  $R_1$ ) are the same and represents an aryl group and Tanaka teaches biphenyl as a preferred aryl group for  $R_1$  (column 3 lines 19-21). Tanaka teaches Ar (applicant's  $Ar^{21}$ ) is preferably a phenyl group, a pyridyl group, a indolyl group, a benxothieryl group, a p-tolyl group, a

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m-tolyl group, a 1-naphthyl group, a 4-bipenyl, and a 9,9'-dimehtyl-2-fluorenyl group (column 3 lines 29-32 and compounds shown in columns 3 through column 11).

Tanaka teaches  $R_4$  (applicant's  $R^{22}$  and  $R^{25}$ ) are hydrogen or an alkyl group having 1 to 4 carbon atoms (column 3 lines 12-18). Tanaka teaches that compounds the meet the limitations of formula (1) can be used to make an electrophotographic photosensitive member with high sensitivity and stable electrophotogrpahic characteristics (column 2 lines 12-17).

27. Tanaka does not specifically teach a compound that meets the limitations of applicant's claims 10, 11, and 49.

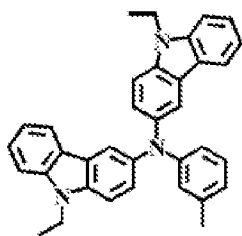
28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make a carbazole compounds where  $R_1$  is biphenyl,  $R_2$ - $R_8$  are hydrogen, and Ar is p-tolyl group, a m-tolyl group, a phenyl group, a 1-naphthyl group, a 4-bipenyl, or a 9,9'-dimehtyl-2-fluorenyl group. Tanaka teaches that  $R_1$  is preferably biphenyl and shows in examples that Ar can be a p-tolyl group, a m-tolyl group, a phenyl group, a 1-naphthyl group, a 4-bipenyl, and a 9,9'-dimehtyl-2-fluorenyl group; therefore, it would have been obvious to one of ordinary skill in the art the make at compound that reads on applicant's claims 10, 11, and 49. The motivation to make the compound would have been to make an electrophotographic photosensitive member with high sensitivity and stable electrophotogrpahic characteristics

29. Claims 10, 11, 29-33, and 50-54 are rejected under 35 U.S.C. 103(a) as being unpatentable Liu et al. (Synthetic Metals 2004, 146, 85-89) (hereafter "Liu") in view of

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Hosokawa (US 6,660,410) (hereafter "Hosokawa") and Thompson et al. (US 2003/0175553) (hereafter "Thompson").

30. Regarding claims 10, 11, 29-33, and 50-54, Liu teaches a carbazole compound



with the following structure, (DECMA, page 86 right column), which reads on applicant's formula (3), where  $R^{22}$  and  $R^{25}$  are hydrogen and  $Ar^{21}$  is m-tolyl. Liu teaches that these carbazoles can be used in light emitting elements and can be found in either the hole injection layer, which is in contact with the anode and is between the anode and the light emitting layer, or in the light emitting layer (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA and page 88 Fig. 4 (A), left column all paragraphs under heading 3.3 EL performances of DECMA-based OLEDs). Liu teaches the light emitting elements can be used in display devices and the display device inherently emits lights, which makes it a light system (page 85 left column first paragraph under heading introduction).

31. Liu does not teach where the N position of the carbazole group contains a biphenyl group.

32. Hosokawa teaches carbazole derivatives that can be used for light emitting devices (column 2 lines 56-67 and column 3 lines 1-29, compounds (11) and (16)) wherein the N position of the carbazole contains a biphenyl group. Hosokawa teaches that by changing the substituent attached to the carbazole group can change the glass

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transition of the material and that the glass transition should be between 110 °C and 170 °C (column 6 lines 33-51). Hosokawa teaches that materials having a glass transition higher than 110 °C have a practical life span and a superior heat-resistance (column 29 lines 46-54).

33. Thompson teaches carbazole derivatives that can be used for light emitting devices. Thompson teaches that adding polyphenyl groups to the N position of carbazoles will increase the glass transition of the material and therefore increase the lifetime of the material producing light emitting devices with improved lifetimes (paragraphs [0074] and [0075]).

34. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole derivative of Liu so the N positions of the carbazoles contained a biphenyl group. The motivation would have been to increase the glass transition temperature of the material and therefore increasing the stability of the material.

### ***Conclusion***

35. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

36. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

37. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./  
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Patent Examiner, Art Unit 1786

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Supervisory Patent Examiner, Art  
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